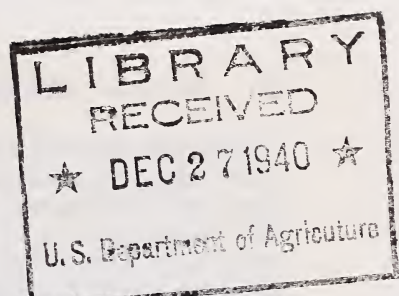


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REPORT OF THE CHIEF OF THE BUREAU OF HOME ECONOMICS, 1940

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF HOME ECONOMICS,
Washington, D. C., August 31, 1940.

HON. HENRY A. WALLACE,
Secretary of Agriculture.

DEAR MR. SECRETARY: I submit herewith the report of the Bureau of Home Economics for the fiscal year ended June 30, 1940.

LOUISE STANLEY, *Chief.*

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THE HOME AND NATIONAL DEFENSE

As the war abroad proceeds and our National defense program unfolds, the 30 million homes in the United States will increasingly feel the impact of this world crisis. No one can now foresee the exact course of events but there cannot fail to be more and more changes in the employment of family members, in sources and perhaps in amount of income, and in ways of spending. These changes will call for adjustments in patterns of living—in the goods and services families buy and use, in the way they spend their income, in the manner in which they employ their leisure time.

In all this shifting scene, the home remains the ultimate user of vast quantities of basic commodities. The home is also the producer of manpower, the conservator and builder of our human resources. And in the last analysis the strength of a nation rests on the quality of its manpower as well as on its armaments. During the last year the Bureau of Home Economics through its research program has concentrated its efforts on providing more of the facts needed by the citizens of this country in maintaining and improving the dietary levels and general well-being of the whole population so that we may be ready for whatever lies ahead.

Through further analysis of the findings of the Nation-wide study on consumer purchases augmented by carefully controlled laboratory studies, important facts are revealed about national nutrition levels. The laboratory studies indicate the kinds and quantities of foods needed to provide the essentials for normal growth and nutrition. Dietary surveys reveal how far short of well-fed are millions of men, women, and children in this country. In many cases this comes through lack of understanding of food values rather than lack of money for buying an adequate diet. Other studies undertaken with the Surplus Marketing Administration show how the diets of low-income families step up in nutritive value when more of the protective foods come within their buying power. Our food problem apparently is one of education as well as income distribution.

Housing, clothing, the proportion of the family income spent for medical care and other items important to health and well-being, likewise have been given careful study. In the textile field, research has developed more buying guides and specifications in terms of consumer needs and indicated more outlets for the use of surplus cotton. The following brief summaries cover some of the more important findings of the Bureau's research during the year.

FAMILY ECONOMICS

Information concerning incomes and consumption of farm families provides a basis for agricultural policies and programs. Especially important are studies that depict and evaluate the ways of living of the lower income farm groups. Such appraisals of family consumption by accepted standards of adequacy focus attention upon the unsolved problems of farm-family welfare that challenge agriculture. Frequently they suggest ways of solution. Studies of consumption patterns of city and village families show actual and potential markets for farm products and indicate ways in which expansion of consumption may aid in the disposal of agricultural surpluses and in increasing the well-being of the Nation's people.

The research and publications of the Family Economics Division during the past year have provided needed facts concerning both of these major problems of agriculture—raising living levels of the less fortunate farm groups; widening domestic markets for surplus farm products. Examples of some of the outstanding findings from these studies of family living are given below.

FOOD CONSUMPTION

America is well fed, compared to many countries; yet there are thousands of families with diets too inadequate from the standpoint of nutrition to foster high levels of well-being. Many of these families live on farms and in villages; not all are in the crowded cities. According to a report of farm diets just completed in the consumer purchases study series, there is need of marked improvement in the diet of about 1 family in every 8 of native-white farm operators in the North and West. The proportion is even greater in the Southeast, where over one-fourth of the white farm operators' families and about half of the Negro farm families studied fell in this category. Poor diets are altogether too common on farms despite present home food-production programs and the fact that the farm family's food tends

to represent a larger share of the money value of living than in the case of village or city dwellers at comparable income levels.

Dietary adequacy usually is associated with a relatively high consumption of dairy products, eggs, fruits, and vegetables other than potatoes. Per capita consumption of these products tends to be greater on farms in the North and West than in the Southeast; greater among families in the higher income classes than in the lower; and greater among small families than among large. Because the farm family's level of consumption of most of the protective foods depends upon home production, adequate diets are most frequently found among those families that take care to plan their programs of food production and conservation in relation to the nutritional needs of the family members.

The average value of the 1935-36 food supply of nonrelief farm families at an intermediate income level (\$1,000 to \$1,250) amounted to \$537, or 47 percent of the total value of family living. Despite a large program of food production and preservation for household use, the money expenditures for food by this group averaged \$194. From half to three-fourths of these families had diets that would cover average nutritive needs with a goodly margin of safety. Of those with diets rated poor, many had meals of too low a money value to be consistent with adequate diet standards, no matter how wise their food choices may have been. Others had meals with money value sufficient to provide adequate diets; but because their choices of the foods they bought and produced were ill-advised, their diets were inadequate with respect to one or more nutrients.

Half or more of the farm families in 1935-36 had incomes below the intermediate level cited above. In this lower income group are to be found most of the families of white sharecroppers and Negroes. The dietary situation of many low-income farm families is suggested by figures from Negro sharecroppers living in the eastern part of North Carolina and in South Carolina—families with net income (money and nonmoney) in the range \$250 to \$500. This group had an average net money income of \$230 which was supplemented by \$126 worth of farm-furnished housing and food. The total food supply—purchased and home-produced—was valued at only 5.2 cents per person per meal. A large proportion of the families, probably 60 percent, had diets that not only failed to meet accepted standards of dietary adequacy but were in marked need of improvement.

The nutrients with respect to which farm diets were found most frequently to be in need of improvement were calcium, ascorbic acid, and vitamin A. In this study the diets were not analyzed for nicotinic acid, a pellagra-preventive factor. The deficiencies that were observed could most readily be safeguarded by an increase in the consumption of dairy products, leafy and green-colored vegetables, and vitamin C-rich foods. Fortunately all of these can be produced on most farms. Once farm people understand the need for these foods, many can improve their diets regardless of money income levels. Tenants and sharecroppers, however, have less freedom of choice in land use than have owners; sharecroppers' families generally have less farm-furnished food than operators'.

The increases now found in farm food consumption with rising incomes are not always those that would contribute most to dietary

adequacy. Each family would do well to determine the variety and quantities of different kinds of food that would meet the nutritional needs of its members and provide attractive and appetizing meals, in keeping with its economic situation and agricultural possibilities. Suitable home production programs could then be inaugurated that would make effective use of all of the resources that might well be marshalled for this enterprise.

THE FOOD STAMP PLAN'S EFFECT ON DIETS OF LOW-INCOME CITY FAMILIES

In most large cities low-income families have little opportunity to improve their diets through home production of food. However, families receiving public aid in many cities are now enjoying more generous diets than usual, thanks to the Food Stamp Plan. In 1939, at the request of the Surplus Marketing Administration, the Bureau of Home Economics undertook a study in Dayton, Ohio, of the influence of this program upon dietary patterns of low-income families.

During August and September 1939, when the study was made, the surplus food list included: Butter, eggs, dry beans, dried prunes, wheat flour, whole-wheat (graham) flour, corn meal, rice, cabbage, fresh tomatoes, fresh green peas, onions (except green onions), fresh peaches, and fresh pears. The chief difference found between diets of participants in the stamp plan and nonparticipants of comparable economic status lay in a significantly higher average consumption of butter and eggs by participants, with a tendency toward higher consumption of all other food groups, especially of fruits, and vegetables other than potatoes. As a result of these differences the nutritive value of the diets of participants tended to be more generous than those of nonparticipants in every respect, but especially in vitamin A. Calcium, the factor in which the diets of many families cooperating in the Dayton study were low, was not much affected by participation in the stamp plan. None of the foods on the surplus list at the time of the study make important contributions of calcium to diets.

The diets of low-income families that were not participating in the stamp plan tended to be low in calories, protein, calcium, vitamin A, and vitamin C. This was especially marked among those spending less than \$1.50 a person a week for food. This group would have benefitted greatly from increased consumption of butter, eggs, fresh vegetables, and fruits—items on the surplus food list in the late summer of 1939—as well as from increased consumption of milk, important for its calcium.

The net effect of participation in the stamp plan upon the nutritive value of the diet of any family depends on three sets of factors: (1) The assortment of the foods that are on the surplus list, the period over which each food is on the surplus list, and the quantities of each selected by the family; (2) customary diets before participation; and (3) the extent to which usual food purchases are maintained during participation.

In Dayton, in the early fall of 1939, butter and eggs accounted for about half of the value of foods obtained free as surpluses (purchases made with blue stamps); and fresh vegetables and fruits, for less than one-fourth. Other purchases made with blue stamps were

distributed unequally among the rest of the foods on the surplus list. This pattern of use of stamps led to improvement in diets with respect to vitamin A, and to a lesser degree, vitamin C. If, in addition to the products then designated as surplus, milk in some form had been on the list, and if families had chosen to allocate to milk a goodly share of the purchasing power afforded by blue stamps, their diets would have been measurably improved in calcium—a much needed food substance.

Some commodities obtained with blue stamps or through direct distribution of surplus foods can be and apparently are consumed as net increase to amounts customarily purchased by most households. This appears to be true for certain fruits, milk in some forms, and to a lesser degree for butter and eggs. For some other foods such as grain products this is not always the case, however. When such products are on the surplus list usual purchases for money may be reduced somewhat (maintaining nevertheless some increases in total consumption) and the money thus released may be spent in part for other foods and in part for other items needed for current living.

The distribution of foods now in surplus through school lunches and the food stamp plan is contributing significantly to improving dietary levels in this country. If, however, the number of acres not needed to satisfy current market demand and to provide a reasonable carry-over of food could be devoted to the foods most needed by the less-favored sections of the population, and if current nutritional deficits of this group could be matched with such surpluses, we should make even greater strides toward our national goal of conserving our human resources.

HOUSING OF FARM FAMILIES

Increasingly widespread realization of the importance of housing in wholesome family living is indicated by the growth of public housing programs during the past 5 years. However, a large proportion of farm families have been and still are unable to provide themselves with dwellings that meet the standards established for housing urban groups. Certain of the requirements for adequate housing that have been formulated for large cities may be less essential from the health standpoint in farm areas with lower population density. However, farm families need and want space, conveniences, and comforts as much as do their city cousins.

The need for bettering farm housing is shown by studies of this and other Government agencies. At least one-eighth of the farm dwellings are so badly in need of repair that they are unsafe or unhygienic. Approximately four-fifths are without running water; family members must carry water from the well which may or may not be conveniently located. If the gage of a "modern" home is one equipped with electric lights, running hot and cold water, and indoor flush toilet, most farmhouses are not "modern"; fewer than one-tenth have all three of these facilities. Although houses generally are more adequate for space needs in farm than urban areas, many farm families, especially those of six members or more, live in crowded quarters.

That farm families want good housing is evidenced by the greater proportion having dwellings equipped with modern facilities and conveniences at upper than lower income levels. To illustrate the kind of housing had by two farm groups, one at an intermediate and one at a

low income level, some facts from a report of the consumer purchases study, completed this past year, are given below.

Among families of white farm operators in the intermediate income class, \$1,000-\$1,249 (the median income of all the Nation's nonrelief farm families in 1935-36 has been estimated at \$965, money and non-money), the size of dwellings tends to meet a generally accepted standard of one person per room, except in the Southeast. There houses tend to be smaller and households larger than in other regions. But in every region some families live in crowded houses. For the country as a whole about one-sixth of the families in the intermediate income class were found to be living in dwellings failing to provide one room per person. This figure ranged from less than 5 percent in Vermont, Washington, and Oregon to about 60 percent of the group of Negro sharecroppers in the Southeast. With respect to sanitary facilities, lighting, and heating, many farm families at this income level still belong to the horse-and-buggy age. Only 16 percent had any running water; only 10 percent had an indoor toilet of any sort; only 12 percent had a central heating system.

Figures from a group of Negro sharecroppers living in the eastern part of North Carolina and in South Carolina, with incomes in the \$250-\$500 range, may be used to illustrate the kind of housing obtained by one low-income rural group. This group had an average of \$153 worth of farm-furnished housing and food in addition to net money incomes of \$230 per family. The houses of these Negro sharecroppers were small relative to family size; 92 percent had fewer rooms than members; 13 percent reported 2 or more persons per room. None had running water, electric lights, or indoor toilets—1 out of 6 lacked even an outdoor toilet. Almost nine-tenths, 86 percent, were heated by fireplaces. Inadequate as were the dwellings of this Negro group, they by no means represent the lowest levels of housing to be found. Thousands of families of migrant workers live in quarters that provide an even less satisfactory environment for wholesome living.

Apparently much of the comparatively poor housing of the individual farm family is due to low income. Survey figures for the year 1935-36 and farm income data for other periods reveal that more than half of the farm families in any year have less than \$500 net money income to use for all family expenditures, for payments on debts, for insurance, and for building up the farm enterprise. Even though costs of building are comparatively low in some rural areas, such incomes cannot provide for housing of the sort required to meet generally accepted concepts of "standard." It is impossible for most families to allocate enough money to repairs, improvements, and installations to provide housing of structural soundness with space adequate for family needs and with running water. Credit has not offered an adequate solution. Even though credit arrangements for home repair and modernization have been greatly improved, it may be unwise for a family to incur such debts. Material increase in indebtedness is especially questionable for the family purchasing its farm.

Seldom do farm tenants have housing equivalent to that of owners, as measured by value, size, or possession of facilities. In 1930 the median value of owners' dwellings was \$1,135, of tenants' dwellings

less than \$500, according to the United States Census. As a group, tenants have less incentive to spend for housing improvements. In former times a young tenant expected to become an owner, and looked forward with change in status to making improvements in the house. Recent trends toward increase in the percentage of tenancy imply that relatively fewer individual farm families have a house-improvement program in prospect.

Many of the considerations that make housing a social problem in cities apply also to the farm community. Repair of substandard dwellings, provision of adequate space, of clean water supplies, of facilities for sanitary disposal of sewage, as well as construction or extension of electric power lines, are housing problems in many rural areas. Without group action farm families even at relatively high income levels are hampered in their efforts to improve housing conditions.

FOODS AND NUTRITION

Practical knowledge of food values and nutritive needs provides the background for evaluating the diets that people choose on their own, for recommending diets that are adequate in all respects, and for estimating the probable needs for different agricultural products. Information of this kind comes in part through research to determine the kinds and amounts of essential nutrients required to maintain and promote maximum health and well-being. It comes also through the collection and interpretation of data on food composition which are used to translate requirements into terms of everyday diets, and through studies of the influence of methods of production, processing, and preparation on the quality and nutritive value of food. The research program of the Foods and Nutrition Division is directed toward the furthering of scientific knowledge that can be used day by day to raise the level of nutrition among the people. Such information can also be adapted to the solution of food problems which arise in connection with droughts, floods, and national emergencies.

VITAMIN STUDIES

A report on our study of the vitamin A requirements of normal adults in terms of common vegetables was published during the past year and new work was directed toward determining, within reasonable limits, the capacity of the human body to accumulate a store of vitamin A. Such reserves could be used to tide over periods of low vitamin A intake, resulting, for example, from a temporary shortage of foods rich in this vitamin or to illnesses that reduce food intake or increase requirements.

Ten experimental subjects cooperated in this phase of the vitamin A study. The time required for these subjects to develop night blindness (a sign of poor adaptation to the dark) when given a diet low in vitamin A, varied between $1\frac{1}{2}$ and 7 months. This indicates a wide range in vitamin A reserves in normal adults.

Results of the study also show that the human body cannot adapt itself to vitamin A intakes below the quantities previously designated as the "minimum physiological requirements" (3,500 to 4,000 International Units per adult per day). Subjects in various stages of the experiments on vitamin A storage and reserves are now being

given 50-, 100-, and 200-percent increases over their minimum requirements to see how effectively they can store vitamin A for use during temporary periods of shortage.

In order to determine certain facts about vitamin A storage which it is impossible to ascertain with human beings, parallel studies were carried on with rats. From weaning, these rats were given a vitamin A-free diet, supplemented with vitamin A at four levels of intake.

An apparatus was devised by means of which the dark adaptation of rats could be tested, so that the visual responses of the rat as affected by vitamin A content of the diet could be compared with the same type of relationship in human beings. As the rats reached maturity, the vitamin A content of the liver was determined by a quantitative chemical method.

The results indicate that when the vitamin A intake of young rats is limited, growth requirements are satisfied before storage in the liver occurs. The experiments to date indicate that the liver stores of vitamin A can be extremely low and still support normal dark adaptation.

The vitamin A value of carotene (the precursor of vitamin A found in plant foods) is enhanced by the addition of small quantities of common edible fats to the diet. A study is under way to determine just what this function of fat is, and how fats differ in promoting the efficient utilization of carotene. Differences among fats with respect to this function vary with the source and, in some cases at least, with the degree of refinement of the fat. Methyl linoleate (a source of unsaturated fatty acid essential for the prevention of scaly skin) was not effective in promoting carotene utilization. It appears from the work to date that fats have a twofold function in promoting the utilization of carotene (1) they act as a carrier for carotene, and (2) they contain a substance which protects the carotene from destruction. It is extremely important that the factors affecting the utilization of carotene be understood, because around 60 to 70 percent of the vitamin A value of average American diets is derived from carotene. In low-cost dietaries the proportion is even larger.

Carotene oxidase, an enzyme present in many plant tissues, especially green pods and leaves, destroys carotene and therefore affects the vitamin A values determined for these foods by biological assays (rat-growth method) unless precautions were first taken to inactivate this oxidase. A paper reporting the importance of preliminary cooking or treatment of the uncooked plant tissue with a mixture of acetone and absolute ethanol to insure the accuracy of results of the assays has been presented for publication. Practical applications of these findings to the homemaker, dietitian, and institutional manager are that raw green leaves should not be allowed to stand long in a finely chopped state, because of loss of vitamin A value; also, that cooking leafy green vegetables renders inactive the enzyme that destroys carotene, the precursor of vitamin A. In contrast to the leaves, raw carrot roots have as much vitamin A value as cooked carrots, indicating that carotene oxidase is probably not present in the roots.

The number of nutrients essential for normal human development and well-being has shown steady and marked increase in recent years.

Further knowledge of the specific value of these nutrients and information as to the amounts present in different foods is essential to the planning of diets. Certain unidentified factors of the vitamin B complex are known to be essential for normal growth and well-being of animals. Crude concentrates of the vitamin B complex in rice polishings have been prepared that supply in one preparation all of these essential unidentified factors. Two factors in this crude concentrate appear to be essential for growth and for the prevention of premature graying of the hair, respectively. The next step of this study, now in progress, is the preparation of diets which will permit the investigation of each of these factors separately, and will determine the relations of other nutrients to the needs of the body for these two new factors.

Following the study of the vitamin B₁ (thiamin) content of about 100 food items published during the fiscal year, a study of the vitamin A content of a similar number of foods used in the average American diet is nearing completion. These assays have been made in terms of the international standard for vitamin A. These data will fill an urgent need, because of the limited amount of information now available on the vitamin A content of food expressed in International Units.

The study of the vitamin B₁ (thiamin) losses during cooking of representative types of ordinary foods was completed. The foods studied included two cereal grains, six common vegetables, and lean pork. The baking of whole-wheat bread causes the destruction of about 15 percent of the vitamin B₁ value of the wheat. The common methods for cooking cereals do not involve significant losses of vitamin B₁ values. Ordinary types of vegetables rarely lose more than 20 percent of their vitamin B₁ value when properly cooked and provided the cooking liquor is utilized. The roasting of lean pork causes a loss of about 40 to 50 percent, and braising of chops a loss of about 15 percent of the vitamin B₁ value of the pork.

In connection with our long-time study of the cooking quality of certain varieties of potatoes, the effect of storage temperature and methods of cooking upon their ascorbic acid (vitamin C) content was determined. The loss of vitamin C content in Irish Cobbler and Green Mountain potatoes during storage for 5 months was greater at 40° F. than at 60°, the most rapid losses occurring during the first few weeks of storage. Losses in the ascorbic acid content of Irish Cobbler potatoes due to cooking varied from a little less than 25 percent to around 10 percent, the greatest loss occurring in potatoes boiled after paring and the smallest in potatoes steamed or boiled in their skins.

The findings of this study, to be published in detail in the *Journal of Agricultural Research*, are of value in the first place to the farmer who produces potatoes on a commercial scale and stores them for periodic distribution. The section dealing with the effect of cooking upon the vitamin C content of potatoes concerns the homemaker and all others engaged in food preparation, because potatoes are an inexpensive year-round food that appears in considerable quantities in many American diets. Though these tubers are not an outstanding source of vitamin C, the contribution that they may make to vitamin C needs, especially in diets of limited variety, is significant.

PROXIMATE COMPOSITION OF FOODS

The circular on the proximate composition of about 1,100 American food items, published within the year, provides authentic information on food values in terms of protein, carbohydrates, fat, water, total ash, and calories. Though this bulletin is invaluable for purposes of dietary calculations, more specific quantitative data on the minerals are also needed, as it reports mineral content only in terms of ash as a whole. Work goes ahead, therefore, on studies of the calcium, phosphorus, and iron content of foods. These three minerals need special attention in food selection, because they may not be present in sufficient quantities in the ordinary diet. Analyses have been made in our laboratories on about 50 food samples and subsamples to provide data on moisture, ash, calcium, and phosphorus content, and other analyses have been assembled and recorded from numerous studies made in outside laboratories.

FOOD QUALITY AND PALATABILITY TESTS

Coordinate with studies of the contributions different foods make to good nutrition are tests on the factors that affect the quality and palatability of food. The results of these studies are important as indicating to farmers and processors the qualities of their products that consumers value most, and in pointing out the relation of variety and cultural conditions to such quality. To consumers they suggest the best use of the different grades and qualities of foods on the market.

Continuing the cooperative project with the Bureau of Plant Industry on potato quality this year, the study of the seasonal effect on the cooking quality of old and new varieties of Maine-grown potatoes was completed. On the basis of cooking quality, 10 varieties were classified as follows: Excellent, Green Mountain; good, Irish Cobbler; average, Katahdin, Chippewa, Houma, Sebago, B127; fair, S4600, Earleine, Warba. Also a report on cooking quality of the potato as measured by specific gravity was published.

Now under way is a study to determine the quality of potatoes for various uses, in relation to their maturity. Chippewa potatoes have been cooked by different methods at regular intervals from the time the potatoes started to develop until after they matured. Tests for starch and sugar content have also been made. Other varieties will be studied, because this kind of information is needed by homemakers and by potato chip manufacturers.

To see whether the present system of egg grading enables the homemaker to know what cooking quality she can expect when she buys eggs of specified grades, a study of egg quality in relation to U. S. retail grades is in progress. Results so far indicate that the grade designations (A or B) do not always indicate a corresponding cooking quality in the eggs. The grade A and B eggs of one distributor were each rated as excellent in our study; of another distributor, as excellent and good, respectively; while grade A eggs from still another rated good, grade B, fair, and ungraded eggs, poor. Of the eggs studied to date, the cooked quality has corresponded fairly well with the quality tests of the raw eggs.

The shortening value of fats in relation to their physical and chemical properties is being studied with a view to obtaining a

practical answer for homemakers and institutional managers who ask what fats on the market give the greatest return in shortening power for the money spent. The breaking strength of pastries and modified shortbreads made from refined steam-rendered lard, leaf lard, hydrogenated lard, hydrogenated vegetable oils, compounds, butter, and animal and vegetable margarines has been recorded as a measure of the shortening value of these fats. Also iodine numbers and congealing and melting points of the fats have been determined. The full report is being prepared for publication. A leaflet on buying guides for food fats and oils is now in press, summarizing information on nutritive value and household uses.

Twenty-four samples of lard collected at inspected establishments by representatives of the Meat Inspection Office of the Bureau of Animal Industry were tested by that office for free fat acids, rancidity, and melting and softening points, and were judged for table quality in this Bureau. In addition to judging the intensity and desirability of odor and flavor of the raw lards at room temperature, the lards were also scored for flavor and odor when made into biscuits. Considerable variation was found in these 24 samples of lard. On the whole, those receiving the highest ratings for flavor when judged in hot biscuits had the lowest free fatty acid content, the highest melting and softening points, and gave a negative test for rancidity. A follow-up study indicated that the choice of hog fat used in making lard had greater influence on the flavor and stability than did the method of rendering.

The long-time study of meat quality and the more recent study of poultry quality were continued in cooperation with two other bureaus in the Department and a number of State agricultural experiment stations. These investigations are carried on to determine the influence of production factors, such as breed, sex, age, ration, curing method, and storage condition on the edible quality of meat and poultry. Results of a study on beef cattle in the Appalachian region, in which grass rations compared favorably with grain as evidenced by the palatability of the meat, were published in a technical bulletin prepared jointly by the cooperating bureaus.

Studies have also been made to determine the yield of meat from turkeys of different weights and ages, when cooked in open and closed pans at different oven temperatures. The yield of meat (white and dark combined) did not appear to be definitely associated with the cooking method used, but it was related directly to the weight of the bird. For example, for 9-pound hens (dressed weight) the yield of cooked meat averaged 30 percent, and for 18-pound toms (dressed weight), 34 percent.

With cooperation from the Corn Industries Research Foundation, a study is under way to determine the extent to which wet-milled corn products have special properties which make their use more desirable than the products now more commonly used for these purposes. The experiment includes the use of corn sirup, dextrose, cornstarch, and corn oil in food preparation and of corn sirup and dextrose in food preservation.

PRESERVING AND USING SURPLUS FOODS

Food-preservation studies were continued in the effort to provide answers to questions from farm homemakers whose home-preserved food is valued at millions of dollars each year. To be able to recommend

methods that give satisfactory results both as to keeping quality and palatability is essential. Serious economic loss and impairment to health may result through spoilage due to unsuitable home canning practices. The study of the home canning of juices was continued and satisfactory methods were developed for juices from red raspberries, cherries, currants, blackberries, plums, and Concord grapes. It was again shown that cool storage of the canned juices is extremely important.

To see whether the use of calcium salts suggested in connection with the commercial canning of tomatoes to produce a firm product had practical application for the homemaker, 60 containers of tomatoes were processed, with and without the addition of calcium chloride, and in both glass and tin. Though the calcium salts resulted in a definite firming of the tomato flesh, their use unquestionably produced some undesirable flavor in the tomatoes which was more noticeable in the glass than in the tin containers.

In line with the Department's program on the distribution of commodities declared as surplus, low-cost, family-size recipes for a number of commodities were prepared for the Federal Surplus Commodities Corporation to send out to relief recipients. To assist managers of school-lunch projects receiving surplus commodities to use these foods to advantage by purchasing only a limited number of supplementary items, 80 recipes were formulated, each on the basis of 12, 25, and 50 portions. These quantity recipes, along with practical information on food selection and food values, will be distributed this fall to aid volunteer workers in the Nation-wide school-lunch program, designed to reach 6 million underprivileged children.

At the request of the Farm Security Administration and the Agricultural Adjustment Administration studies have been made of the use of cane sirup, sorghum, dried and frozen eggs, a new type of brown-rice flour, and peanut flour. Cane sirup and sorghum are the sole sweetening agents available to homemakers in certain areas and special recipes are needed for their satisfactory use, especially on a low-cost basis. The dried and frozen eggs were being considered for distribution as a surplus commodity for use in the school-lunch projects. The studies of brown-rice flour and of peanut flour were requested as a step towards extending the use of these agricultural products.

TEXTILES AND CLOTHING

Effective utilization of American fibers is a problem of major significance to the national economy in an emergency situation. Translated in terms of the homemaker's responsibility, this means the most careful buying, often the making, and always the care of the many items of family clothing, bedding, and the other textiles which go to make up a home's furnishings.

COTTON HOSIERY

Continuing the project assigned to the Bureau by the Congress, to study the possibility of utilizing American-grown cottons in hosiery manufacture, 83 plain and novelty types of women's full-fashioned hose have been designed. Selected samples of these have been knit from yarns ranging from 60/2 to 120/2 and subjected to laboratory

analysis. The results were used in improving the appearance and wear of designs subsequently developed. These tests showed that the hose were equal to or surpassed those on the market when measured by bursting strength and by the hosiery test for elastic properties. The study has demonstrated that suitable cotton hose can be made in attractive colors with acceptable color permanence, that the stretch welt decreases the bagginess and that certain designs will reduce the mottled effect sometimes apparent in cotton hose without unduly lowering the bursting strength.

In a serviceability study made in cooperation with a local hospital, 68 student nurses wore cotton hose made from 90/2 and 120/2 yarns with the conventional plain welt and with a stretch welt made by knitting four courses with a regular stitch and two courses with a so-called loose stitch. Each pair was worn one day, then returned to the Bureau for laundering and mending. Hose were removed at regular intervals and tested for wale and course count, bursting strength, elongation, shrinkage, fluidity in cuprammonium hydroxide, and elastic properties. For the plain and stretch welt 90/2 hose the average length of life was 31 and 33 days and for the 120/2, the averages were 23 and 22 days, respectively. Improvements have been made in the reinforcement sections of the hose subsequently knitted to overcome certain weaknesses made apparent by the test.

Comparisons are now being made of the qualities of hose manufactured under controlled experimental conditions from five American-produced varieties of cotton: Coker-Wilds, Sea Island, Pima, S×P, and Backcross (P11×S×P), the latter three, termed as American-Egyptian, were secured from the United States Field Station, Sacaton, Ariz. These known cottons were spun into the fine 120/2 yarn. The yarns, grading A or A+ in the photographic yarn-appearance test for the singles were knit into 42-gage full-fashioned hose for nurses and will be tested in a serviceability study.

In an effort to improve the appearance of yarns and the hose knit from them, a study of the effect of speed of spinning and of twist multiplier has been undertaken in cooperation with the Texas Technological College in Lubbock. Yarns from Coker-Wilds were spun at three different speeds and from S×P with three different twist multipliers. These yarns will also be knit into 42-gage hose and will be subjected to service and laboratory tests.

The hosiery industry is kept informed of each new development in this study by press releases and illustrated articles in the trade and technical journals. Two exhibits of the hosiery designed by the Bureau are maintained in New York City. Trade papers record the increasing number of mills which have started making cotton hosiery since this study was undertaken. Some are manufacturing hose according to the specifications developed by the Bureau; others are making modifications of these.

This work not only points a way for the increased consumption of cotton, but also provides information which will save the industry considerable time in experimentation and expense if there is an interruption in the importation of silk.

The physiological effects of clothing—a new field of investigation—are being explored in connection with the Bureau's studies on hosiery. Local effects which consciously or subconsciously affect the

individual's comfort, such as changes in skin temperature and heat losses caused by wearing different types of hose are being measured. Thus far, the effects of hose on skin temperature, heat radiation, and insensible perspiration on 20 subjects during periods following rest and exercise in one set of environmental conditions (dry bulb 21° C., relative humidity 65 percent) have been studied. Further research is to be conducted with the subjects placed in other environmental conditions.

A study is also under way to determine the efficacy of hose impregnated with copper sulfate in the treatment of "athlete's foot."

Efforts are being made to devise finishing treatments which will increase the elasticity and enhance other desirable properties of cotton hose. Water repellency, or "splashproofness," is one of these properties that can be imparted to hosiery by a suitable finish, such as the quaternary ammonium compound, octadecyl oxymethyl pyridinium chloride, a chemical that reacts with the cellulose in cotton to produce a water-repellent finish.

In order to evaluate the water repellency of cotton hose to which finishing treatments had been applied, it was necessary to estimate this property quantitatively. Search of the literature revealed that very little had been done in testing hosiery for water repellency, although a number of tests had been devised for heavier fabrics. Several of these methods which could be modified to make them more suitable for a fabric as light and porous as cotton hosiery were tried but proved unsatisfactory.

Two methods which measure the resistance of fabrics to the absorption of water were finally adopted. One, known as the "spot test" now in use in commercial testing laboratories, simulates splashes of rain. The other, an immersion test, might correspond to heavy downpour of rain falling on a fabric. This test was devised by the Bureau especially for this study on hose.

FABRIC DETERIORATION BY MICRO-ORGANISMS

Many requests come to the Bureau for information relating to the action of various types of bacteria and fungi (mildew) on both cotton and wool. Homemakers as well as industries suffer serious losses in fabrics deteriorated by these micro-organisms. They reduce the strength of fabrics and produce unsightly stains that usually cannot be removed.

Almost no quantitative data are available on the effect of micro-organisms on textiles and little has been done to develop finishes that will protect fabrics from their action. This Bureau therefore undertook a study in cooperation with the Bureau of Plant Industry to determine the optimum condition of growth for 10 molds commonly found on cotton.

For this purpose a factorial experiment was designed in which micro-organisms, temperature, humidity, and time are varied. It includes 704 conditions in all, as it comprises all possible combinations of one sterile control, 10 organisms using each one separately, 4 temperatures, 4 humidities, and 4 lengths of time.

The organisms being studied are *Actinomyces* sp., *Alternaria* sp., *Anthostomella* sp., *Brachysporium* sp., *Chaetomium funiculum*, *Chaetomium globosum*, *Fusarium* sp., *Oidiodendron* sp., (a), *Oidioden-*

dron sp., (b), *Stachybotris* sp. They were selected from a large number of isolations, each of which was evaluated for its ability to cause loss in breaking strength of a fabric when tested according to a method developed in the Department. All of the organisms chosen were able to reduce the strength of the fabric more than 80 percent in this test.

A range of temperature, humidity, and time was selected which was believed to include the conditions under which the organisms chosen would use cotton as a source of energy. Temperatures of 70°, 80°, 90°, and 100° F., relative humidities of 70, 80, 90, and 100 percent, and periods of incubation of 1, 2, 4, and 8 weeks were selected. The fabric for the test was a 10-ounce unbleached cotton duck, a material frequently used in making articles that are exposed to conditions favoring mildew.

The effects of the growth of the molds have been tested physically by measuring the breaking strength, and the changes in thickness and weight of the fabric. Chemically the growth of the organisms is being determined by measuring the amount of catalase produced.

The results obtained to date from this investigation indicate that these particular organisms do not grow at the two lower humidities. Only slight growth occurred at the 90-percent humidity, while considerable growth was produced at 100 percent. Under the conditions of this experiment, more deterioration was found at the lower temperatures than at the higher ones. A linear relationship was observed between the deterioration of the fabric and the length of time of exposure. The organism *Stachybotris* sp. produced more damage than any of the others, including *Chaetomium globosum*.

An exploratory survey of finishing treatments for making cotton fabrics resistant to mildew was made. Approximately 135 treatments considered of possible value for this purpose were applied to unbleached cotton duck and their effectiveness in preventing mildew was tested. Breaking strength determinations were made on treated strips of cotton duck, after inoculation and incubation with *Chaetomium globosum*. The loss in strength expressed in terms of the corresponding untreated material was obtained. The smaller this loss, the greater the resistance of the fabric to becoming mildewed, that is, the greater is the protection furnished by the mildew-preventing treatment.

According to this method the following treatments give satisfactory protection as indicated by little or no loss in fabric strength: (1) Acetylation with acetic anhydride, glacial acetic acid and zinc chloride for 21 hours at 20–25° C.; (2) acetone with formalin; (3) tetra-alkyl quaternary ammonium halide; (4) salicylanilide applied alone and followed by methyl acrylate resin or by wax and aluminum acetate emulsion and in all cases not steam sterilized, also an emulsion of salicylanilide with wax and aluminum acetate emulsion; (5) orthophenyl phenol, 2-chlor-orthophenyl phenol, and also pentachlorophenol; (6) sodium pentachlorophenate alone and followed by cadmium chloride, lead subacetate, or potash alum; (7) chlorthymol applied alone and followed by wax and aluminum acetate emulsion when not steam sterilized; (8) thymol with phenyl salicylate; (9) cutch; (10) copper and zinc naphthenate emulsions; (11) copper propionyl acetate; (12) paratolyl mercury salicylate; (13) phenyl

mercury oleate; (14) cadmium soap, also copper soap; (15) cadmium chloride followed by borax; (16) copper sulphate and sodium hydroxide, also copper sulphate and sodium carbonate.

Although these treatments give adequate protection against mildew, many of them have other properties which make them undesirable for application to fabrics. For instance, some are colored, some may be toxic or deteriorate fabrics and therefore are not suitable for all conditions of use or for all types of fabric. Some may not withstand weathering or laundering. Hence, these treatments are being subjected to further tests. This will include determining the mildew resistance of treated fabrics after exposure to weathering for various periods of time, after storage, and after repeated laundering.

In connection with studies on the action of micro-organisms on fabrics, treatments for sterilizing fabrics are also being developed.

A public service patent which was granted during the year is based on one phase of this research. This patent entitled "Processes for protecting materials of keratin composition," involves sterilizing fibrous materials of keratin composition by heating them in Stoddard solvent, a dry-cleaning fluid. Wool fabrics were used as the keratin in developing the process. It was found that the procedure sterilized wool fabrics without damaging the fibers. The method is also valuable for disinfecting raw textile materials such as wool, mohair, horsehair, silk, and other natural and artificial fibers, protein in nature. Articles which may be manufactured from these fibers can also be sterilized by this procedure. Heretofore, any process that killed the micro-organisms in keratins did considerable damage to the material itself.

The two types of micro-organisms that it may be necessary to kill are the ones that cause disease and those that deteriorate keratin. *Bacillus mesentericus* was used as the test micro-organism since it is harder to kill than most disease organisms and is one of the causal organisms in wool damage.

The process has as yet been tried only under laboratory conditions, but it is believed to have practical possibilities for commercial use. It could be used in hospitals and dry-cleaning establishments for the purpose of sterilizing blankets, clothing, and other articles after contact with contagious disease and would be of special value during a Nation-wide epidemic of disease or a time of widespread disaster such as war, floods, fires, or earthquakes. Since Stoddard solvent is employed in the dry-cleaning industry, clothing and household or institutional textiles could be cleaned and sterilized in one operation.

Stoddard solvent is used for degreasing purposes such as removing oils and fats from raw wool during scouring. By the patented process, raw wool can be degreased and sterilized in one operation. This method of scouring may avoid danger from animal-borne infectious disease.

WOOL SUBSTITUTES

Any increased drain on the world's wool supply due to the requirements for armed forces is likely to result in the substitution of other fibers in fabrics commonly made of wool. The Bureau is therefore continuing its serviceability tests on fabrics composed of various percentages of new and reworked wool and synthetics. Methods

of determining the amount of wool in mixed fabrics are also receiving attention. Such methods are basic in consumer evaluation of materials. The Bureau has recently taken the leadership in a cooperative study comparing the aluminum chloride and sulfuric acid methods of determining wool in wool-rayon mixtures, which is being done under the auspices of the American Society for Testing Materials. The fabrics used in this study were manufactured for experimental purposes in a woolen mill from known new wool and spun viscose rayon. They contain respectively, all wool, approximately two-thirds wool, approximately one-third wool, and all rayon.

The average wool contents as determined by the five cooperating laboratories for samples analyzed by the aluminum chloride method were 99.7, 61.6, 30.2, and 0.05 percent; by the sulfuric acid method, 99.9, 63.4, 30.8, and 0.05 percent. A statistical study of the data showed that even the largest of the differences in results obtained by the two methods, namely, 1.8 percent, is within the experimental error.

However a lack of agreement between results obtained by the same method in the different laboratories was clearly shown. From all these findings it was concluded that if the techniques involved can be so standardized that results from different laboratories will agree more closely, both the aluminum chloride and sulfuric acid methods for the quantitative estimation of wool in mixtures may prove to be highly satisfactory for routine testing.

CONSUMER BUYING GUIDES

Tying in with the Department's efforts to increase the use of American-grown fibers, cotton fabrics with special qualities and finishes have been made into garments illustrating types of designs and kinds of construction which complement the fabric qualities and give increased consumer satisfaction and service. Exhibits showing the utilization of cotton in clothing are lent through the Extension Service and other organizations, to groups of women and girls studying clothing selection and construction. Eighty-six such loans were made during the past fiscal year, and reports indicate that thousands of women and girls manifested interest in increased use of cotton in clothing.

At the request of the National Youth Administration, a collection of low-cost cotton clothes was planned in accord with the income and needs of the N. Y. A. girls. These garments were developed for use in the State work of this organization. In cooperation with the Extension Service, suggestions for judging 4-H clothing exhibits were prepared and published for the assistance of State 4-H club leaders.

HOUSING AND HOUSEHOLD EQUIPMENT

Adequate and conveniently planned homes and properly selected equipment for family needs contribute toward raising the level of living, conserve energy and labor, and release time for additional income-producing activities or for activities related to the social life of the family or community.

Housing and household equipment research has been pointed toward: (1) Establishing minimum desirable standards related to

family size, for suitable working space, storage areas, and the amount and arrangement of equipment for both urban and rural homes at different income levels; (2) giving the homemaker facts to guide her in buying equipment, using it effectively, and caring for it properly.

HOUSING

The urgent need for better housing for both rural and urban families makes necessary careful planning so that the money expended will provide the most in housing value. Such planning must be based on factual data as to minimum desirable standards for family living requirements. Architects and housing agencies are looking to the Bureau of Home Economics to supply the information.

Studies of the space and facilities required for different household activities and work areas provided in rural houses for families of different sizes and income levels serve as guides in obtaining better housing values for money expended.

To secure the needed factual data, a study has been started to determine the minimum and desirable storage and counter space needed and the most efficient arrangement in farm kitchens planned for families of different sizes in the low and middle income groups.

The first farm kitchen studied was 13 feet 6 inches by 12 feet, with an adjoining general utility room. This kitchen illustrated the L arrangement of equipment with dining space included. It was equipped with the minimum desirable number of utensils needed for typical food processes for families of four and eight, respectively. The efficiency and adequacy of the kitchen for families of these sizes were tested by studies of the time and motions involved in the work connected with 2 days' meals. Data on the food used by farm families in different regions of the United States were the basis for the menus. Using the same test meals the study is being continued for kitchens of other types of arrangements and other sizes.

Floor plans and elevations for the farm kitchen and utility room were prepared for distribution. Plans of urban kitchens prepared the previous year, illustrating minimum space requirements with different arrangements of equipment, have been revised to conform to recent specifications of the United States Housing Authority.

EQUIPMENT TESTS

Extensions of electric lines bring the convenience of electric current to many more families each year and reach further and further into the homes of the lower income groups, where labor-saving devices are badly needed. The low cost of this energy makes possible the use of a wide variety of household equipment and appliances. Selection of this equipment becomes a major problem for many homemakers.

The electric-roaster study on which progress was reported last year has been completed. It shows that though a roaster is not a substitute for a range it has value as a supplementary cooking appliance. The roaster may be used occasionally when additional baking and roasting space is needed. Also in hot climates it may take the place of the range now and then and reduce fatigue for the homemaker.

The electric roaster has these advantages: It requires less attention than a kerosene or coal range. The initial cost of a roaster is nominal when compared with that of an electric range. A roaster may be

plugged in on the regular appliance circuit while special and costly wiring is required for a range.

Since the length of time for roasters to preheat to any given temperature and the energy used to accomplish the work are not dependent on size, selection must be based rather on the capacity and shape which will be adequate for the amount and kind of work expected of it. Oval roasters hold less food as a rule than those of rectangular shape. Well-marked temperature dials and easily seen lights are a convenience. Although the internal temperatures at any one setting of the thermostat of the roasters tested varied considerably, all but one were satisfactory in performance when used under conditions appropriate for that particular model. Poor products resulted when roasters were overcrowded. This emphasizes the importance of selecting a model which will be large enough for the family needs.

Surveys show that an electric iron is the first appliance purchased when electric current becomes available. Prices of electric hand irons vary from 89 cents to \$12.50. Naturally homemakers are anxious to know what constitutes the difference in cost and on what basis, if any, the higher-priced irons are justified.

To secure this type of information a study of electric hand irons has been started. Irons varying in price, size, shape, weight, wattage, type of heating elements and thermostatic controls as well as irons of the same weight, same wattage, and similar surface areas are being studied. Such points as the following are noted: Ability to provide proper ironing temperatures which will give satisfactorily ironed materials; accuracy of the thermostat settings marked for different fabrics when an iron is equipped with a temperature control; the consumption of electrical energy for a given amount of work; the time necessary to accomplish this amount of work; the ease of handling each iron.

Designs in refrigerators and their accessories change rapidly and frequent tests must be made in order to furnish the consumer with timely information on the value of new features, as well as on energy consumption. A number of 1940 models with a capacity of 6 cubic feet have been tested. In a no-load test the monthly gas consumption was approximately 1,800 cubic feet at 90° F. ambient temperature while the electric cabinets under exactly the same conditions averaged approximately 27 kilowatt-hours for the same period.

BUYING GUIDES FOR HOUSEHOLD EQUIPMENT

The wide choice of household equipment available makes necessary wise selection. There are many types and models change from year to year. To guide the housewife in making choices adapted to her needs and pocketbook, buying guides have been prepared for gas and electric ranges, refrigerators, vacuum cleaners, electric irons, and sewing machines. These guides include information on use and care since these may influence markedly the efficiency and length of life of household equipment.

PUBLICATIONS AND INFORMATION SERVICES

The American way is that the findings of research conducted at public expense in the interests of health and general welfare, shall

be made public in such a way as to be of the greatest good to the greatest number.

Acting on that principle, the Bureau of Home Economics issued its material in the form of printed bulletins for homemakers, technical reports for research workers, news releases, radio talks, and exhibits. A total of 24 publications were printed or sent to the press during the fiscal year. A list of these follows together with citations to the more important journal articles.

DEPARTMENT PUBLICATIONS

- Outlook for farm family living, 1940. Misc. Pub. 377.
- Consumer purchases study: Family income and expenditures, Plains and Mountain region. Part 1, family income. Urban and village series. Gertrude Schmidt Weiss, Day Monroe, Kathryn Cronister. Misc. Pub. 345.
- Consumer purchases study: Family income and expenditures, Pacific region and Plains and Mountain region. Part 1, family income. Farm series. Day Monroe, Dorothy S. Martin, Margaret Perry, Kathryn Cronister. Misc. Pub. 356.
- Consumer purchases study: Family income and expenditures, Middle Atlantic and North Central region and New England region. Part 1, family income. Urban and village series. Day Monroe, Elizabeth Phelps, Dorothy S. Brady, Idella G. Swisher. Misc. Pub. 370.
- Consumer purchases study: Family income and expenditures, Southeast region. Part 1, family income. Urban and village series. Dorothy Brady, Day Monroe, Gertrude Weiss, Thelma Dreis. Misc. Pub. 375. (In press.)
- Consumer purchases study: Family income and expenditures, Middle Atlantic, North Central, and New England regions. Part 1, family income. Farm series. Dorothy S. Martin, Day Monroe, Dorothy Brady, Elizabeth Phelps. Misc. Pub. 383. (In press.)
- Consumer purchases study: Family income and expenditures. Part 2, family expenditures. Urban and village series. Dorothy Brady, Day Monroe, Elizabeth Phelps, Edith Dyer. Misc. Pub. 396. (In press.)
- Consumer purchases study: Family housing and facilities. Hazel Kyrk, Day Monroe, Maryland Y. Pennell, Edith M. Dyer. Misc. Pub. 399. (In press.)
- Consumer purchases study: Family expenditures for medical care. Five regions. Urban, village, and Farm. Helen Hollingsworth, Day Monroe, Margaret C. Klem, Karl L. Benson. Misc. Pub. 402. (In press.)
- Consumer purchases study: Family food consumption and dietary levels. Hazel K. Stiebeling, Day Monroe, Callie M. Coons, Esther F. Phipard, and Faith Clark. Misc. Pub. 405. (In press.)
- The vitamin B₁ content of foods in terms of crystalline thiamin. Lela E. Booher and Eva R. Hartzler. Tech. Bul. 707.
- Beef production and quality as affected by method of feeding supplements to steers on grass in the Appalachian region. W. H. Black, R. L. Hiner, L. B. Burk, Lucy M. Alexander, C. V. Wilson. Tech. Bul. 717. (In cooperation with Bureau of Animal Industry, Agricultural Marketing Service, and West Virginia Agricultural Experiment Station.)
- Proximate composition of American food materials. Charlotte Chatfield and Georgian Adams. Cir. 549.
- Poultry cooking. Unnumbered pub.
- Fats and oils for cooking and table use. Elizabeth Fuller Whiteman and Florance B. King. Leaflet 204. (In press.)
- Children's body measurements for sizing garments and patterns. Ruth O'Brien and Meyer A. Girshick. Misc. Pub. 365.
- Physical and chemical changes produced in bleached cotton duck by *Chaetomium globosum* and *Spirochaeta cytophaga*. Ruth Elmquist Rogers, Helen G. Wheeler, and Harry Humfeld. Tech. Bul. 726. (In cooperation with Bureau of Plant Industry.)
- Cotton shirts for men and boys. Margaret Smith. Farmers' Bul. 1837.
- Judging fabric quality. Bess Viemont Morrison. Farmers' Bul. 1831.
- Women's dresses and slips: A buying guide. Clarice L. Scott. Farmers' Bul. 1851. (In press.)
- Liquefied gas for the household. A. H. Senner and Helen S. Holbrook. Leaflet 191. (In cooperation with the Bureau of Agricultural Chemistry and Engineering.)
- House cleaning management and methods. Carol Willis Moffet. Farmers' Bul. 1834.
- Electric light for the farmstead. Farmers' Bul. 1838. (In cooperation with the Bureau of Agricultural Chemistry and Engineering.)
- Closets and storage spaces. Maud Wilson, J. Robert Dodge, and Elma Edwards. Farmers' Bul. 1865. (In cooperation with Bureau of Agricultural Chemistry and Engineering.) (In press.)

ARTICLES IN JOURNALS AND TRADE PAPERS

- Consumer classification and specifications for cotton broadcloth. Gladys White and Margaret B. Hays. Amer. Dyestuff Rptr. 28: 410, 431-436, 439, illus. Aug. 7, 1939.
- Consumer specifications for textiles. Margaret B. Hays. Jour. Home Econ. 31: 444-446. Sept. 1939.
- Recent research in family housing. Dorothy S. Brady. Jour. Home Econ. 31: 554-555. Oct. 1939.
- The minimum vitamin-A requirements of normal adults. II. The utilization of carotene as affected by certain dietary factors and variations in light exposure. Lela E. Booher and Elizabeth C. Callison. Jour. Nutr. 18: 459-471, illus. Nov. 1939.
- Cooking quality of the potato as measured by specific gravity. C. F. Clark, P. M. Lombard, and Elizabeth Fuller Whiteman. Amer. Potato Jour. 17: 38-45. Feb. 1940.
- Adequate nutrition for the industrial worker. Lela E. Booher. Amer. Med. Assoc. Jour. 114: 548-553. Feb. 17, 1940.
- Effect of cooking upon the thiamin content of foods. Elizabeth Aughey and Esther Peterson Daniel. Jour. Nutr. 19: 285-296. March 1940.

The children's measurement project as recently directed by the United States Bureau of Home Economics. Ruth O'Brien. Designer and Mfr. 14 (5): 20-21. March 1940.

Finishing treatments applied to cotton hose. Margaret S. Furry and Lillian E. Weidenhammer. Amer. Dyestuff Rptr. 29 (8): 203-205. Apr. 15, 1940; (9): 229-234, illus. Apr. 29, 1940.

Water repellency of cotton hose. M. S. Furry and L. E. Weidenhammer. Rayon Textile Monthly 21 (6): 72-73.

The effect of cooking and storage on the ascorbic acid value of potatoes. Lydia A. Rolf. Jour. Agr. Res. (In press.)

A study of some of the physical properties of women's full-fashioned hosiery knit from commercial cotton yarns. Margaret B. Hays, Emma C. Petersen, and Delia A. Taylor. Jour. Home Econ. (In press.)

Cotton fabric research in the Bureau of Home Economics. Ruth O'Brien. Jour. Home Econ. (In press.)

Approximately 2 million copies of the Bureau's popular bulletins were distributed on request last year. Over 100,000 of these requests came solely in response to the weekly broadcasts by the Bureau's staff on the National Farm and Home Hour, a coast-to-coast network program, in which the Department of Agriculture regularly reports news of its research.

In addition to displays of current publications and research projects at the American Home Economics Association annual meeting, exhibits were arranged for the Eighth American Scientific Congress, and the Afro-Merican Exposition. Portable panels showing publications available were also circulated to 67 State home economics meetings and regional conferences.

